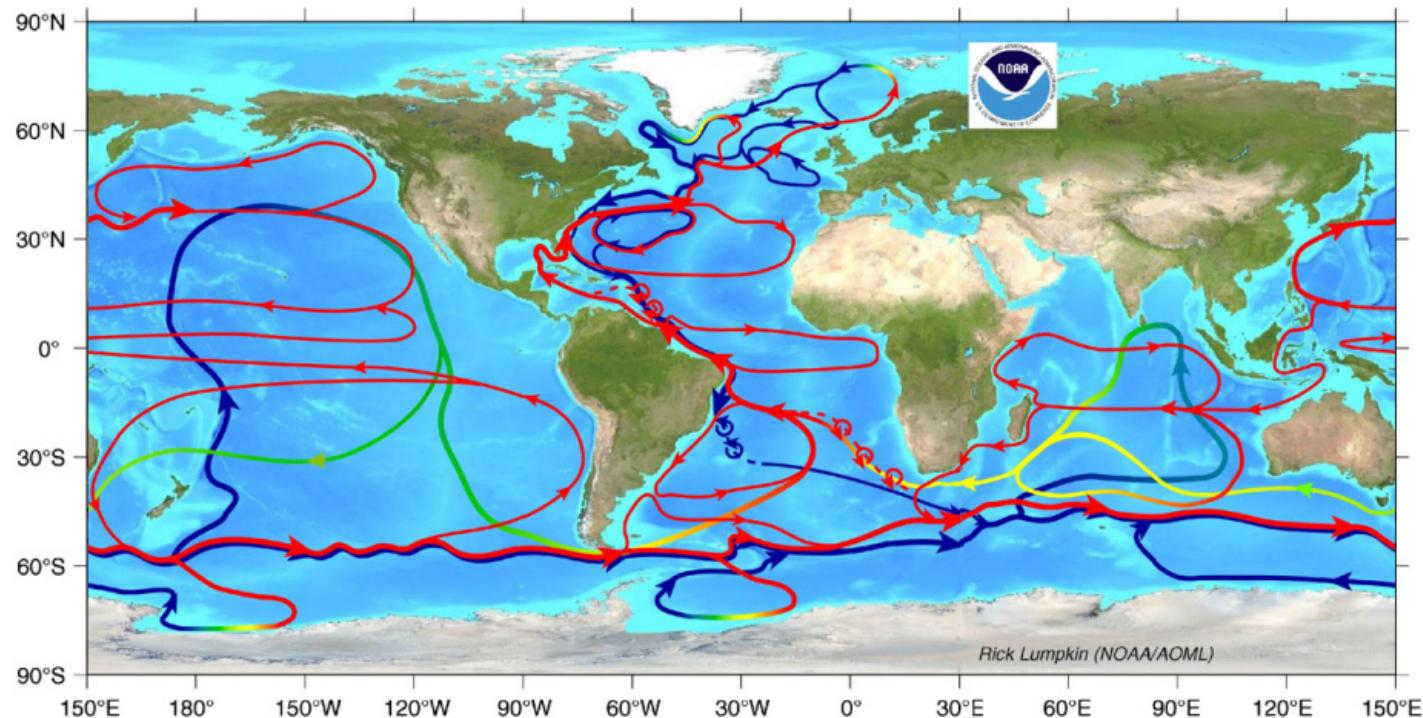


AAIW Formation and Circulation in ECCO2



Antonio F. H. Fetter & Victor Zlotnicki
Jet Propulsion Laboratory – California Institute of Technology



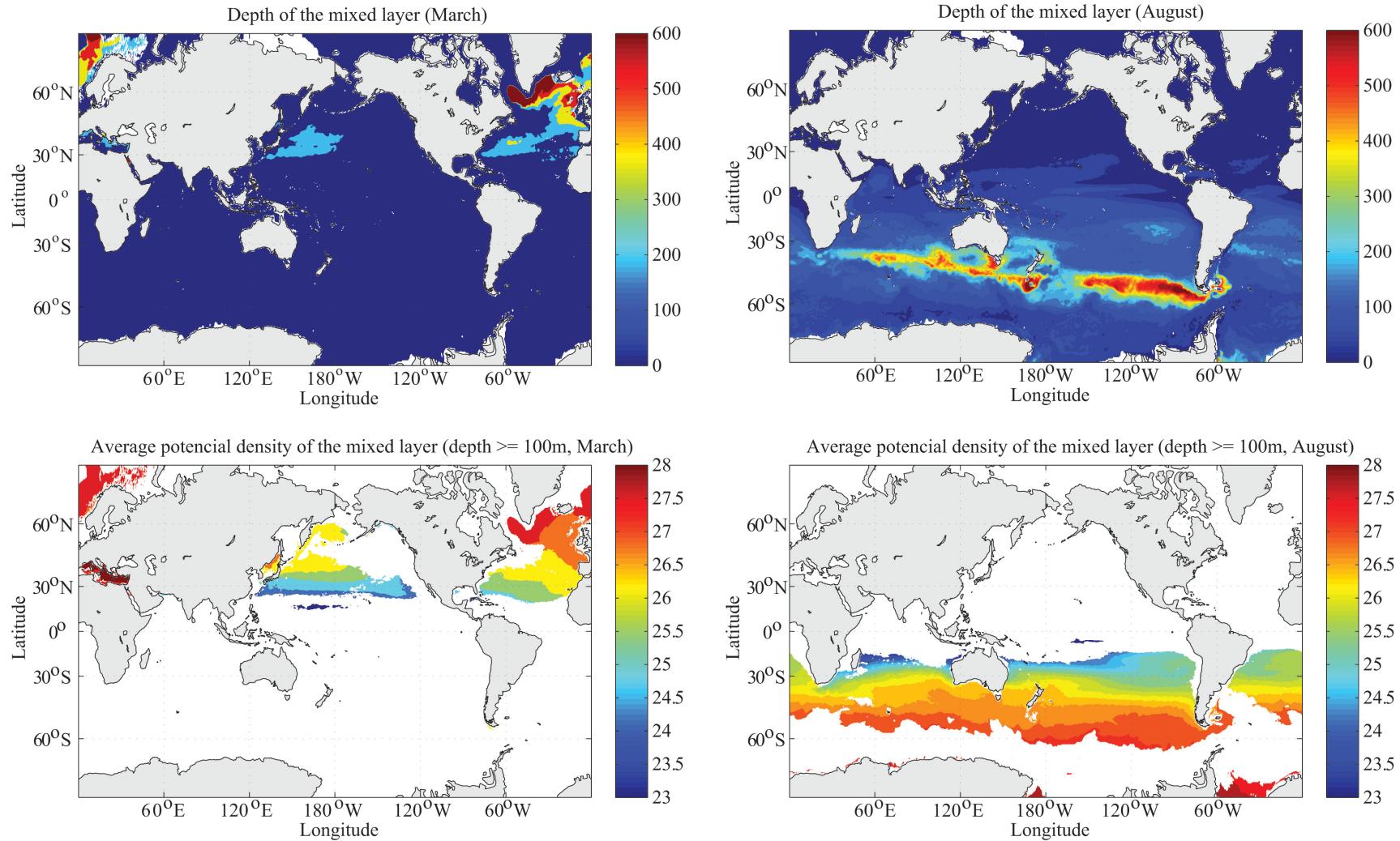
Objectives

1. To assess ECCO2 ability on reproducing the observed rates and patterns of AAIW formation and circulation.
 2. To estimate the changes in the ACC frontal locations in ECCO2 and altimetry.
3. To investigate to what extent the rate of formation of AAIW is related to the meridional migrations of the SAF.
 4. To elucidate the diapycnal processes involved in the formation of the AAIW (e.g., Ekman contribution, eddy fluxes and air-sea fluxes).
-

ECCO2 Setup

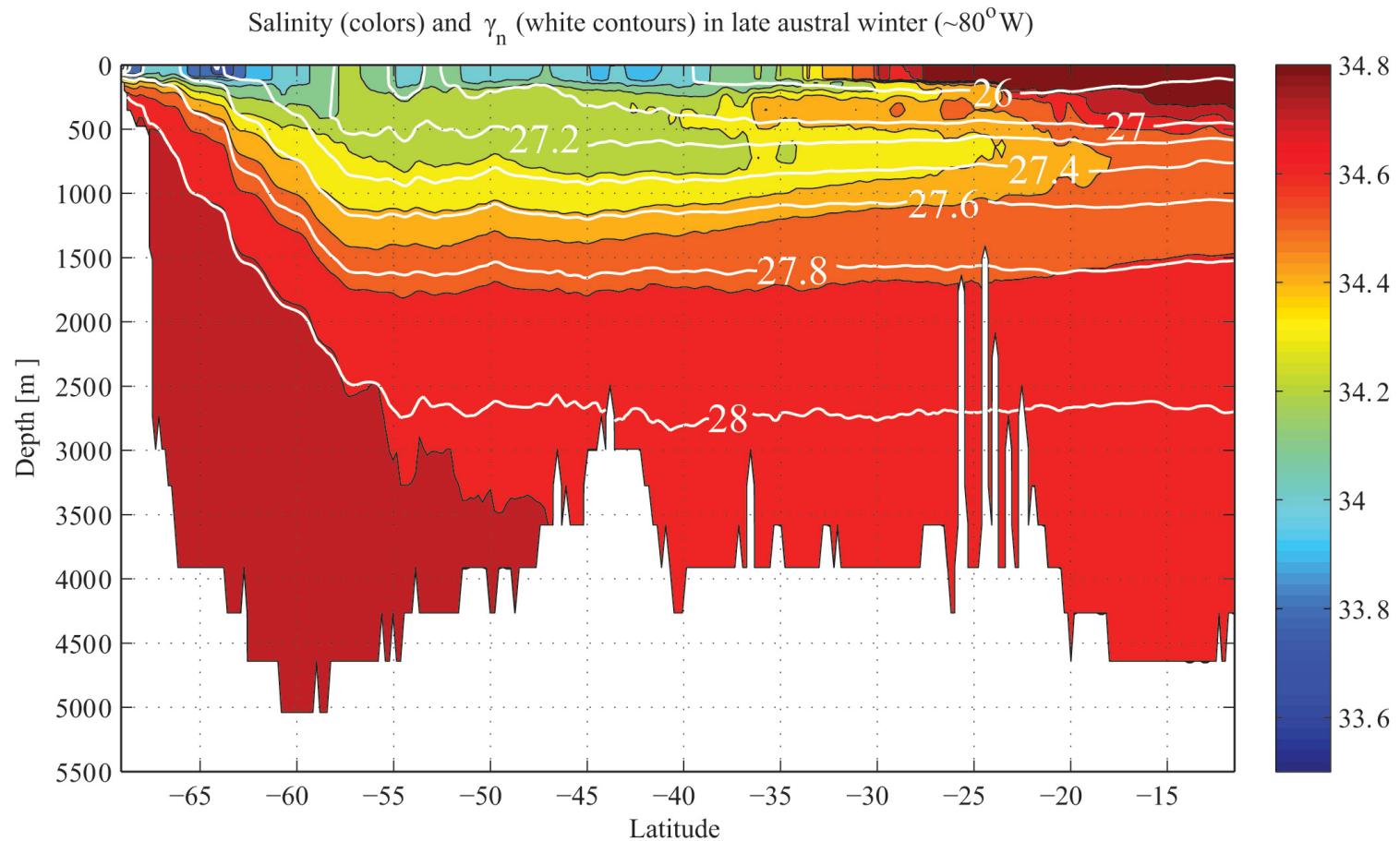
- ECCO2 run: cube 84.
- MITgcm.
- z-coordinates with shaved cells.
- Cubed-sphere with 510x510 grid cells (~18 km)
- 50 vertical levels.
- ECCO2 solutions are obtained by an orthogonal projection of the state vector onto available satellite and in-situ data.

Deep Winter Convection

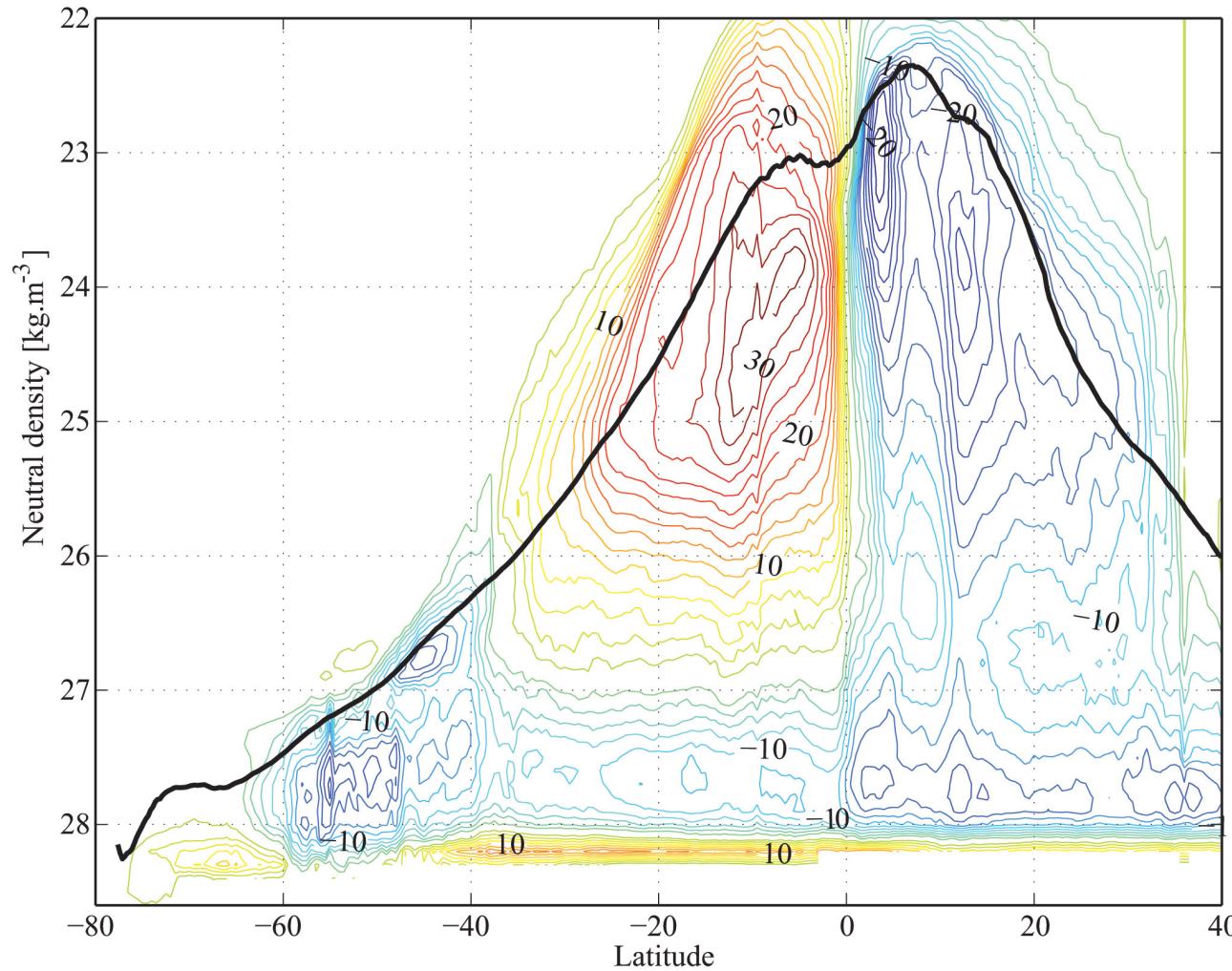


afetter@jpl.nasa.gov

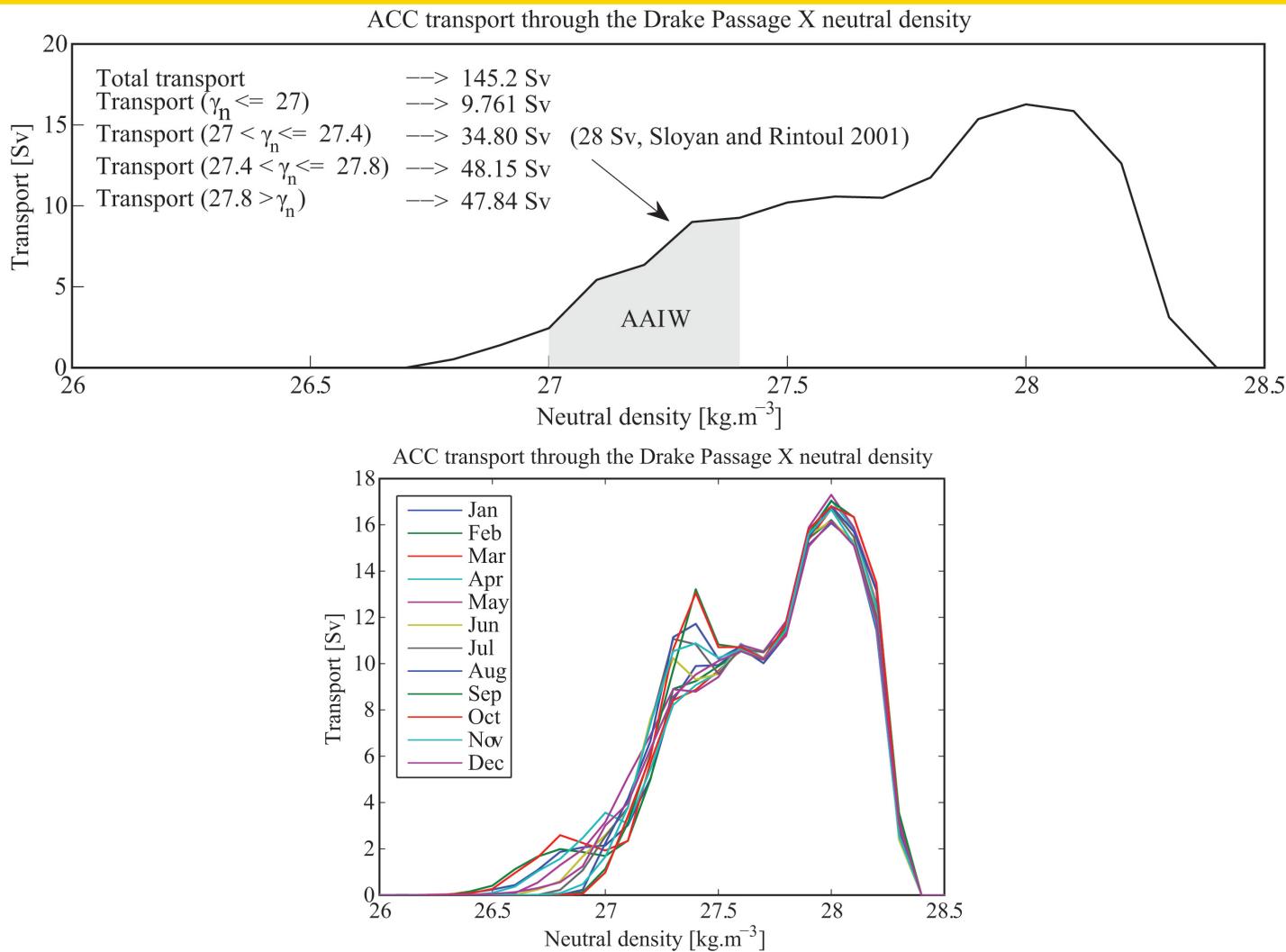
Deep Winter Convection – AAIW Density Class in ECCO2



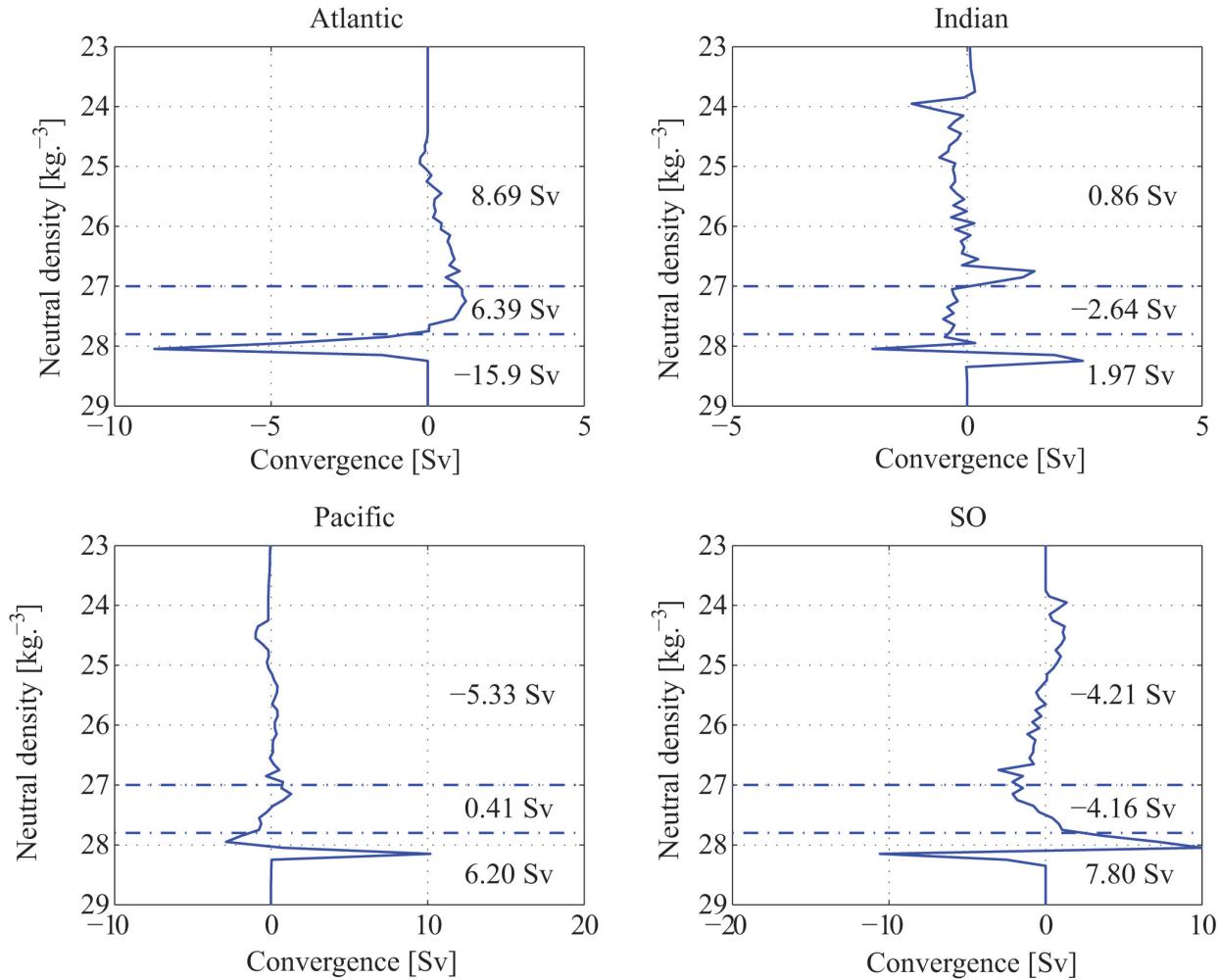
Meridional Overturning Stream Function in Neutral Density Space



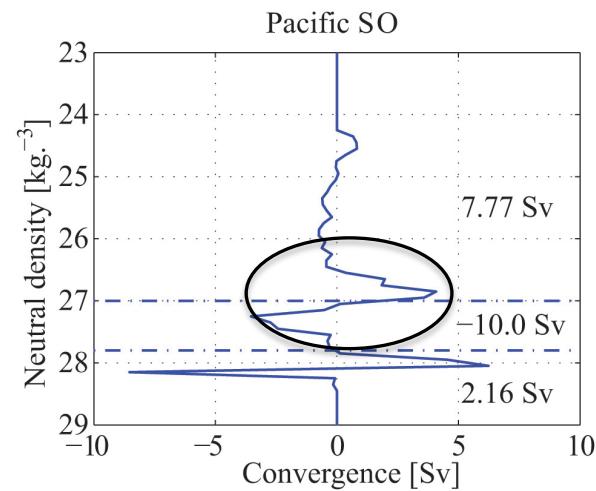
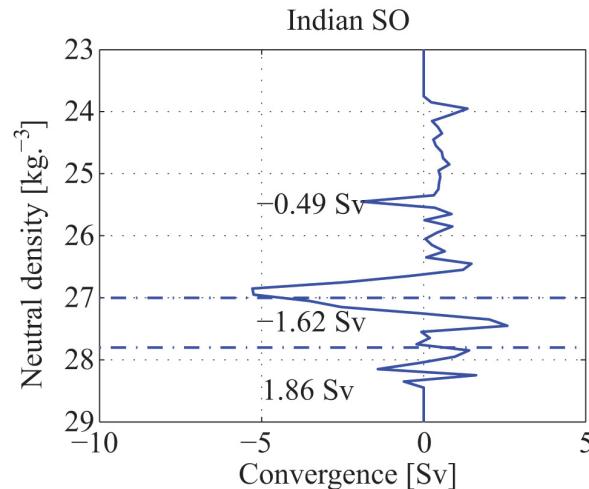
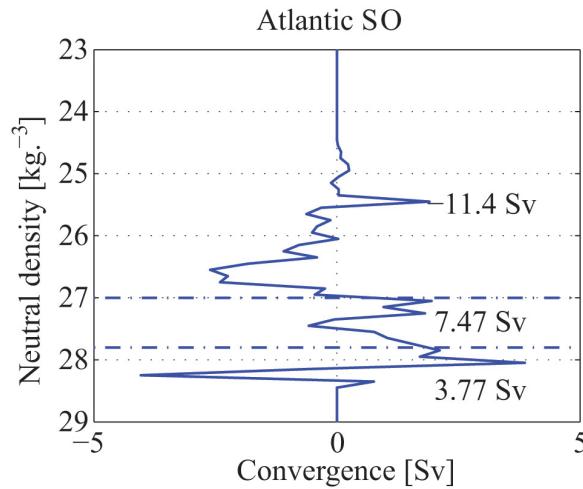
ACC Transport in the Drake Passage in Neutral Density Space



Water Masses Convergence in each Ocean Basin

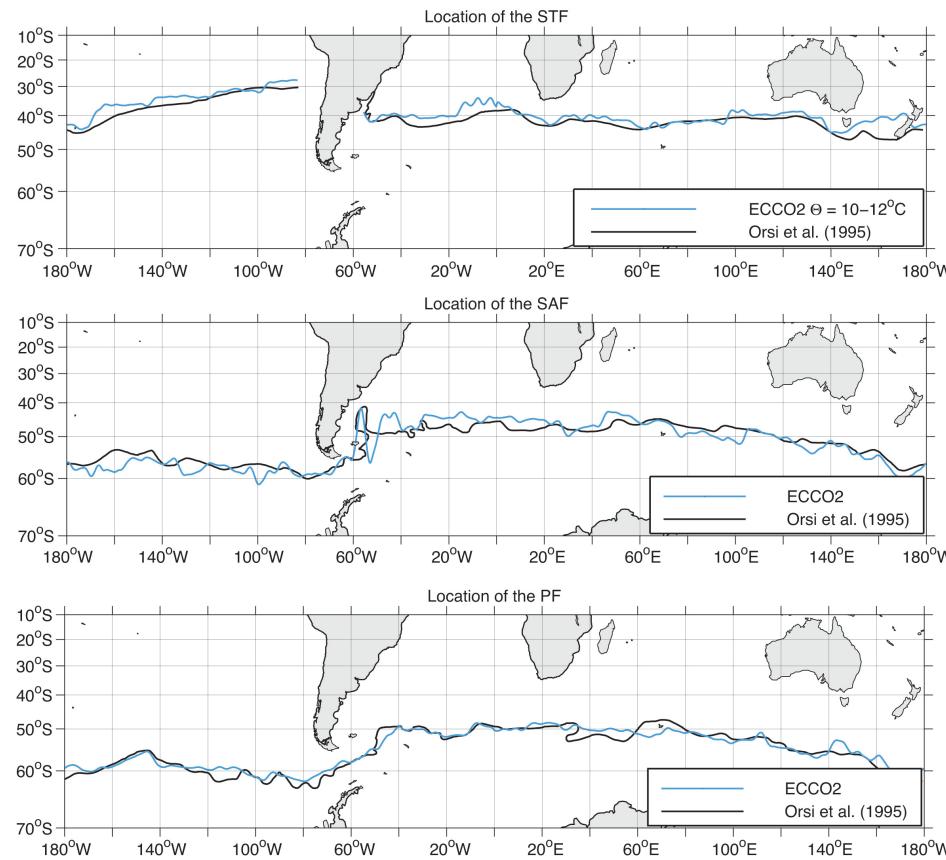


Water Masses Convergence in each Ocean Basin – Southern Ocean



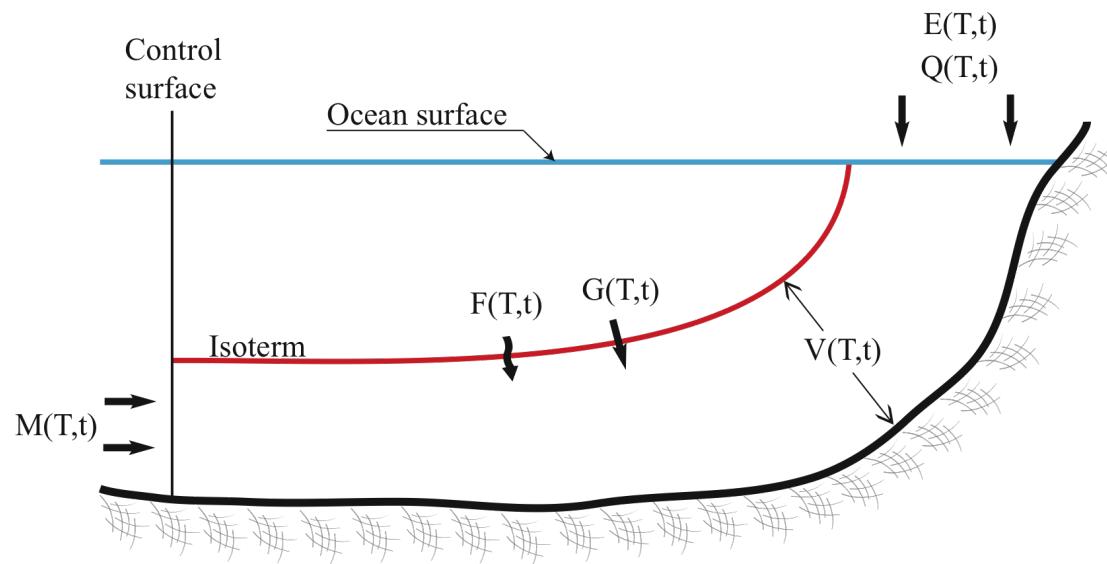
Conclusions & Future Work

- To investigate to what extent the rate of formation of AAIW is related to the meridional migrations of the SAF.



Conclusions & Future Work

- To elucidate the diapycnal processes involved in the formation of the AAIW (e.g., Ekman contribution, eddy fluxes and air-sea fluxes).



$$\frac{\partial}{\partial t} V(T,t) = M(T,t) + E(T,t) + G(T,t)$$

$$G = -\frac{1}{c} \frac{\partial F}{\partial T} - \frac{1}{c} \frac{\partial Q}{\partial T}$$

Water mass transformation (Walsh, 1982)

Thank you for your attention!

Thank you very much to Michael Schodlok, Dimitris Menemelis and the ECCO2 group.